

# JAPAN

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JIS B 6510 (1989) (English): Test methods for performance and accuracy of spindle moulding machines

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*The citizens of a nation must  
honor the laws of the land.*

Fukuzawa Yukichi

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**JAPANESE INDUSTRIAL STANDARD**

**Test Methods for  
Performance and Accuracy of  
Spindle Moulding Machines**

**JIS B 6510—1989**

**Translated and Published**

**by**

**Japanese Standards Association**

In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.

## JAPANESE INDUSTRIAL STANDARD

J I S

Test Methods for Performance and Accuracy  
of Spindle Moulding Machines

B 6510-1989

## 1. Scope

This Japanese Industrial Standard specifies the test methods related to the functions, running performances and rigidity and inspection methods on static accuracies and machining accuracies of the spindle moulding machines of 100 mm or under in effective cutting height for the spindle shaper moulding machines, and of 100 mm or under in effective cutting height and 100 mm or over to 680 mm or under in the distance between the main spindle centres for the double-spindle moulding machines, among the spindle shaper moulding machines specified in No. 6321 and the double spindle moulding machines specified in No. 6322 of JIS B 0114, hereinafter these are generically referred to as the "spindle moulding machines".

Remark: The units and numerical values given in { } in this Standard are based on the traditional unit and are appended for informative reference.

## 2. Methods for Functional Tests

The functional tests on the spindle moulding machines shall be in accordance with Table 1.

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### Applicable Standards:

JIS B 0114-Glossary of Terms for Wood Working Machinery

JIS B 6507-General Code of Safety for Wood Working Machinery

JIS B 6521-Methods of Measurement for Noise Emitted by Wood Working Machinery

JIS B 6602-Safety Standards for Construction of Spindle Shapers

### Corresponding International Standard:

ISO 7009-Woodworking machines-Single spindle moulding machines-Nomenclature and acceptance conditions

### Reference Standards:

JIS B 6501-Test Code for Performance and Accuracy of Wood Working Machinery

JIS Z 8203-SI Units and the Use of their Multiples and of Certain Other Units

Table 1. Functional Tests

No.	Test item	Test method
1	Electrical equipment	Before and after the running test, examine the insulating condition once each.
2	Start, stop and running operations of main spindle	At an appropriate main spindle speed of rotation, carry out 10 times of start and stop continuously to examine the smoothness and reliability of actions.
3	Changing operation of main spindle speed of rotation	Change the main spindle speed of rotation over entire marked speeds of rotation to examine the smoothness of actions and the reliability of indications of the operating device.
4	Manual feed operation	Examine the smoothness and uniformity of actions throughout overall length of movement by the manual feed handle, and rotate the sensitive feed handle several times to examine the smoothness and uniformity.
5	Ascending and descending and clamping operations of main spindle, and operation of automatic stopping device	<p>Allow the main spindle to ascend and descend to examine the smoothness and uniformity of actions throughout overall length of the motions, and examine the reliability of clamping and the smoothness of actions of the clamping device at the both ends and centre of motions.</p> <p>In addition, examine the smoothness and reliability of actions of the automatic stopping device at the both ends of motions.</p>
6	Ascending and descending and clamping operations of table	Ascend and descend the table to examine the smoothness and uniformity of actions throughout the overall length of motions. In addition, examine the reliability of clamping and the smoothness of actions of the clamping device at the both ends and centre of motions.
7	Attaching and detaching of cutter	Examine the reliability and smoothness of the attaching, detaching and clamping screw of the cutter.
8	Safety device	Examine the reliability of the safety functions for operators and protective functions for machine [see JIS B 6507 and JIS B 6602].
9	Lubricating device	Examine the reliability of such functions as oil tightness and proper distribution of quantity of oil.

Table 1 (Continued)

No.	Test item	Test method
10	Oil hydraulic pressure equipment	Examine the reliability of such functions as oil tightness and pressure regulation.
11	Pneumatic pressure equipment	Examine the reliability of such functions as air tightness and pressure regulation.
12	Accessories	Examine the reliability of functions.

Remark: For a spindle moulding machine which is not provided with any functions concerned, the test items corresponding to these in Table 1 are to be omitted.

### 3. Methods for Running Tests

**3.1 No Load Running Test** Rotate the main spindle, continue running for 30 to 60 minutes, measure required electric powers and noise after bearing temperatures have been stabilized, record on respective items specified in Table 2 Record Format 1, and observe, at the same time, by the sense of touch that no abnormal vibration exists.

Furthermore, the measurement of the noise shall be in accordance with JIS B 6521.

Table 2. Record Format 1

No.	Time of measurement O'clock minute	Speeds of rotation of main spindles min <sup>-1</sup> {rpm}				Temperatures °C				Room temperature	Required electric powers						Noise dB (A)	Description
						Main spindle bearings					Left			Right				
		Left		Right		Left		Right			Voltage V	Current A	Input kW	Voltage V	Current A	Input kW		
		Marking	Actual measure- ment	Marking	Actual measure- ment	Upper	Lower	Upper	Lower									

Remarks 1. Regarding the spindle shaper moulding machine, records shall be filled in the left side columns of Record Format 1.

2. For a spindle moulding machine provided with the speed change device of the main spindle speed of rotation, records shall be taken on at least 2 levels of speeds of rotation including the maximum speed of rotation.

3. Regarding the measuring conditions of noise, these shall be recorded in the description column.

**3.2 Load Running Test** Carry out the cutting of the test material, measure required electric powers and noise, take records on respective items specified in Table 3 Record Format 2, and observe, at the same time, by the sense of touch that no abnormal vibration exists and the conditions of the cut surface.



In the measurement of the required electric powers, carry out testing by changing depths of cut at a constant feed speed or changing feed speeds at a constant depth of cut.

Table 3. Record Format 2

No.	Test material			Tool				Cutting condition				Required powers										Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Dimensions			Species of tree or type of wood	Water content %	Diameter mm	Thickness mm	Length of cutting part, mm	Number of teeth	Tooth shape	Material of cutting edge	Main spindle speed of rotation min. <sup>-1</sup> (rpm)	Peripheral speed m/min	Feed speed m/min	Depth of cut mm	Cutting width mm	Left						Right																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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Remarks 1. The required electric power for a spindle shaper moulding machine shall be recorded on the left column of Record Format 2.

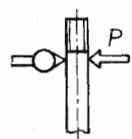
2. Regarding the cutting direction of the test material and measuring conditions of the noise, these shall be recorded on the description column.

3. The tooth shape shall be illustrated and enter its main dimensions.

4. Regarding that of manual operation, required electric power may not be measured.

4. Method for Rigidity Test The rigidity test of the spindle moulding machine shall be in accordance with Table 4.

Table 4. Rigidity Test

No.	Test item	Measuring method	Figure for measuring method
1	Flexural rigidity of main spindle system	Applying a fixed test indicator to the end part (side face) of the main spindle, apply a load ( $P$ ) to the main spindle in horizontal direction <sup>(1)</sup> , alternately from confronting directions each other, and measure the deflections of the main spindle. Carry out these measurements in respective directions of in the left and right and in the front and rear.	

Note <sup>(1)</sup> The position to which the load is to be applied shall be the nearer position to the main spindle end as far as possible, and the distance from the main spindle end shall be recorded.

- Remarks 1. The rigidity test of the machines of the same design shall represent by the results of a test which has been carried out on a representative table, and for others it may be omitted.
2. Regarding the size of the load ( $P$ ), measurements shall be carried out by applying the recommended load ( $P$ ) by the manufacturer, and this load ( $P$ ) shall be recorded.
3. This measurement shall be carried out with rotating the main spindle after the bearing temperatures have been stabilized.

5. Methods for Static Accuracy Inspections

The static accuracy inspections for the spindle moulding machines shall be in accordance with Table 5.

Table 5. Static Accuracy Inspections

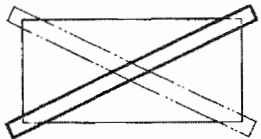
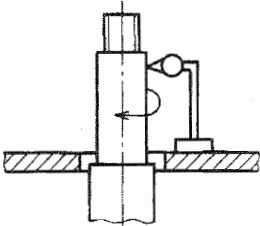
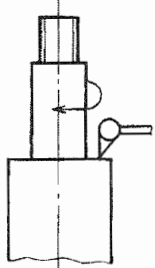
Unit: mm				
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
1	Straightness of upper surface of table	Place a straightedge of 1000 mm diagonally on the upper surface of the table <sup>(2)</sup> , measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.10 per 1000
2	Runout of main spindle	Fix the main spindle table at the upper most part <sup>(3)</sup> , rotate the main spindle manually, applying a test indicator to the outer peripheral surface of the mounting part of the cutter, and consider the maximum difference of the readings of the test indicator during rotation to be the measured value.		0.03 at the position of 100 from the upper surface of the table
3	Runout of flange end face of main spindle	Applying a test indicator to the flange end face of the main spindle, rotate the main spindle manually, and consider the maximum difference of the readings of the test indicator during rotation to be the measured value.		0.02

Table 5 (Continued)

Unit: mm

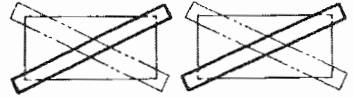
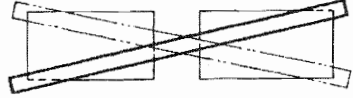
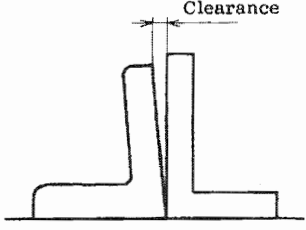
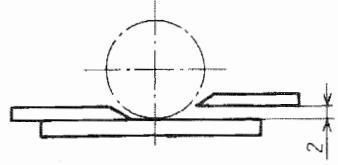
No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
4	Straightness of ruler surfaces <sup>(4)</sup>	Right ruler	Place straightedges on diagonal lines of the ruler surfaces, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.04 per 300
		Left ruler			0.04 per 300
		Both rulers	Place a straightedge on diagonal line so that it straddles over the left and right rulers, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.10 per 500
5	Squareness of ruler surface with respect to upper surface of table		Stand a square on the upper surface of the table, apply this to the ruler surface and measure the clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.05 per 100
6	Parallelism of ruler plate surfaces <sup>(4)</sup>		Set the right ruler plate surface as the condition of 2 mm in cutting allowance, apply straightedge in left and right direction, measure the clearances between this and the right ruler plate surface, and consider the maximum difference to be the measured value.		0.05 per 200

Table 5 (Continued)

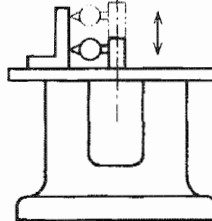
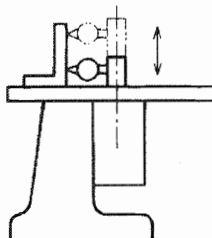
Unit: mm					
No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
7	Squareness of upper surface of table with respect to vertical motion of main spindle	Right and left direction	Stand a square on the upper surface of the table <sup>(5)</sup> , apply a test indicator which has been fixed to the main spindle to this, travel the main spindle vertically, and consider the maximum difference of readings of the test indicator to be the measured value <sup>(6)</sup> .		0.05 per 100
		Front and rear direction			0.05 per 100

Table 5 (Continued)

Unit: mm

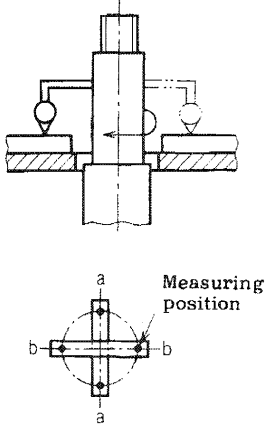
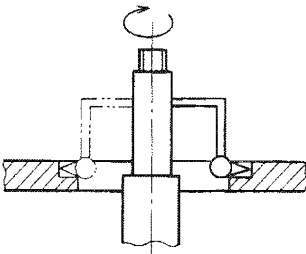
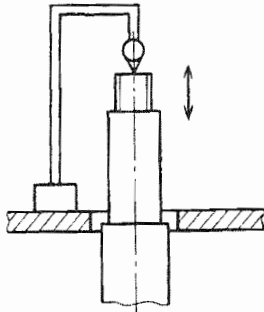
No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
8	Squareness of centre line of main spindle with respect to upper surface of table	Right and left direction	Place a straightedge on the right and left or front and rear direction of the upper surface of the table, fix the main spindle at the uppermost part <sup>(3)</sup> , apply a test indicator which has been fixed to the main spindle to this, swing it by 180°, and consider the maximum difference of the readings of the test indicator to be the measured value <sup>(6)</sup> .		0.08 per swing diameter of 300
		Front and rear direction			0.08 per swing diameter of 300
9	Coaxiality of guide ring with respect to main spindle		Fix the main spindle table to the uppermost part <sup>(3)</sup> , apply a test indicator which has been fixed to the main spindle to inner periphery of groove for guide ring and swing this by 360°, and consider $\frac{1}{2}$ the maximum difference of readings of the test indicator to be the measured value.		0.05

Table 5 (Continued)

Unit: mm				
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
10	Movement of main spindle in axial direction	Fix a test indicator to the upper surface of the table, apply the end face of the main spindle to this and shake the main spindle in axial direction <sup>(7)</sup> , and consider the maximum difference of the readings of the test indicator to be the measured value.		0.04

Notes <sup>(2)</sup> In the case where a measuring distance is smaller than the reference, the numerical value of the permissible value of measurement shall be converted in proportion to the distance.

<sup>(3)</sup> That of which table ascends and descends, measurement shall be made by fixing the table at the lower-most part.

<sup>(4)</sup> That of which ruler is made of wood, this is not applicable.

<sup>(5)</sup> The square shall be placed at the centre of the right and left or front and rear of the table.

<sup>(6)</sup> When readings are to be taken, the knee shall be fastened firmly.

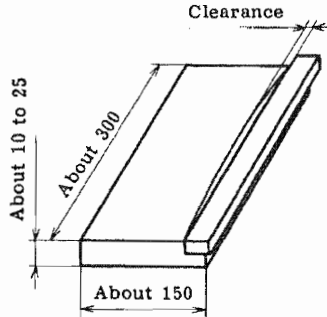
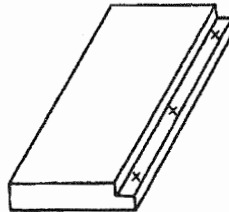
<sup>(7)</sup> The force to shake the main spindle in the axial direction shall be approximately 150 N {approximately 15 kgf}.

Remark: A spindle moulding machine not provided with the functions concerned, test items equivalent to these in Table 5 are omitted.

# 6. Methods for Machining Accuracy Inspections

The machining accuracy inspections for the spindle moulding machine shall be in accordance with Table 6.

Table 6. Machining Accuracy Inspections

Unit: mm				
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
1	Straightness of cut edge surface	Fit a flat right-angled cutter to the cutter fitting part, cut the edge surface of the test member by applying to the ruler, measure clearances along the overall length with a feeler gauge and by applying a straightedge to the breadth portion of cut-off remnant, and consider the maximum value to be the measured value.		0.10 per 300
2	Accuracy of thickness	Measure the height of the cut-off remnant of above-mentioned test member with callipers. Carry out this measurement at 3 places of the centre and both ends of the test member, and consider the maximum difference to be the measured value.		0.10

Remark: The test member shall be treated with a necessary pre-processing in advance.



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